TECH OFFER

Smart Polymers for Stress Absorption and Surface Modification

KEY INFORMATION

TECHNOLOGY CATEGORY:
Chemicals - Polymers
Materials - Plastics & Elastomers

TECHNOLOGY READINESS LEVEL (TRL): TRL7
COUNTRY: JAPAN
ID NUMBER: TO175446

OVERVIEW

The technology owner is seeking partners to co-develop new applications using two smart polymers based on advanced polyolefin materials with the following properties:

- Stress absorption – a α-olefin copolymer designed to provide exceptional damping, stress relaxation, and texture control. With shape-memory and viscoelastic properties, it enables tailored molding solutions and enhanced vibration control across industrial and consumer applications.
- Surface modification – a block polymer additive that imparts water- and oil-repellent properties to polyolefin surfaces. With its silicone-like performance, this additive can be applied to coatings, films, paints, and textiles, making it a practical and sustainable solution to meet increasingly stringent environmental regulations and to reduce reliance on PFAS and conventional silicone-based materials.

Both smart polymers are designed for seamless integration into existing extrusion and molding processes. Their versatility

supports broad innovation potential in industries such as sports, healthcare, mobility, construction, and textiles, enabling partners to create differentiated, high-performance products.

TECHNOLOGY FEATURES & SPECIFICATIONS

Material for stress absorption:

- Copolymer with shape-memory and viscoelastic properties
- Reversible hardness adjustment depending on temperature
- Maintains rigidity at low temperatures, becomes flexible at higher temperatures
- Excellent energy absorption and durability under repeated stress
- Provides temperature-responsive mechanical properties not achievable with conventional polyolefins

Material for surface modification:

- Block polymer additive consisting of silicone and polyolefin segments
- Imparts silicone-like properties (water repellency, oil repellency, anti-smudge) to polyolefin surfaces
- No additional surface treatment required
- High compatibility with polyolefin matrices for easy blending and processing
- Sustainable alternative to PFAS-based or conventional silicone coatings

Both materials are compatible with existing plastic extrusion and molding processes.

POTENTIAL APPLICATIONS

Potential applications of these materials include:

- Stress absorption material can be applied to medical cushioning materials and rehabilitation pads, shock-absorbing components in sports shoes and protective gear, automotive interiors, and vibration-damping parts in consumer electronics. By combining comfort and safety, it also shows strong potential for wearable devices and next-generation mobility solutions.
- Material for surface modification can be used to enhance stain, water, and oil resistance in coatings and paints, provide water-repellent functions to construction films and automotive interiors, improve oil and dirt resistance in textiles, and increase fingerprint resistance on electronic devices.

UNIQUE VALUE PROPOSITION

- Delivers temperature-responsive hardness and energy absorption for adaptive comfort and impact protection (stress absorption material)
- Imparts silicone-like water and oil repellency through simple blending, without additional surface treatment (surface modification material)
- High compatibility with existing extrusion and molding processes, minimizing adoption barriers